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NIC# 13651

Packet Radio Temporary Note # 12

Safety Standards - Microwave Exposure

Since it is proposed to incorporate solid-state sources into hand-held terminals, it is appropriate to consider briefly the safety standards for exposure to microwave radiation. The present generally-accepted standard in the United States permits human exposure to a maximum microwave power density of 10 mW/cm^2 for periods of 0.1 hour or more and a maximum energy density of 1 mW hour/cm^2 during any 0.1 hour period. This standard was recommended by the American National Standards Institute (ANSI) Committee C95.1 in 1966 and pertains to all frequencies between 100 MHz and 100 GHz. Note that the standard applies whether the radiation is continuous or intermittent. The ANSI C95.1 standard has also been proposed for occupational exposure in accordance with the U. S. Occupational Safety and Health Act of 1970. A more recent standard recommendation under consideration by the American Conference of Governmental Industrial Hygienists (ACGIH) requires that average power density levels up to but not exceeding 10 mW/cm^2 be allowed for total continuous exposure times not exceeding the eight-hour workday. Average power density levels from 10 mW/cm^2 up to but not exceeding 25 mW/cm^2 are allowed for total exposure times of not longer than ten minutes during any ten minute period during an eight-hour workday. Average power densities in excess of 25 mW/cm^2 are not permitted.

It should be pointed out substantial controversy exists concerning the 10 mW/cm^2 safety level, with certain groups in favor of both raising and lowering the standard. In the Soviet Union the maximum permissible exposure level is 0.1 mW/cm^2 for a workday. However, the U. S. standard of 10 mW/cm^2 has been in effect for roughly 15 years, and no evidence of injury occurring at this level has been reported in the Western literature.[1]

1. Michaelson, S. M., "Human Exposure to Nonionizing Radiant Energy - Potential Hazards and Safety Standards", Proc. of the IEEE, Vol. 60, pp. 389 -421, April, 1972.

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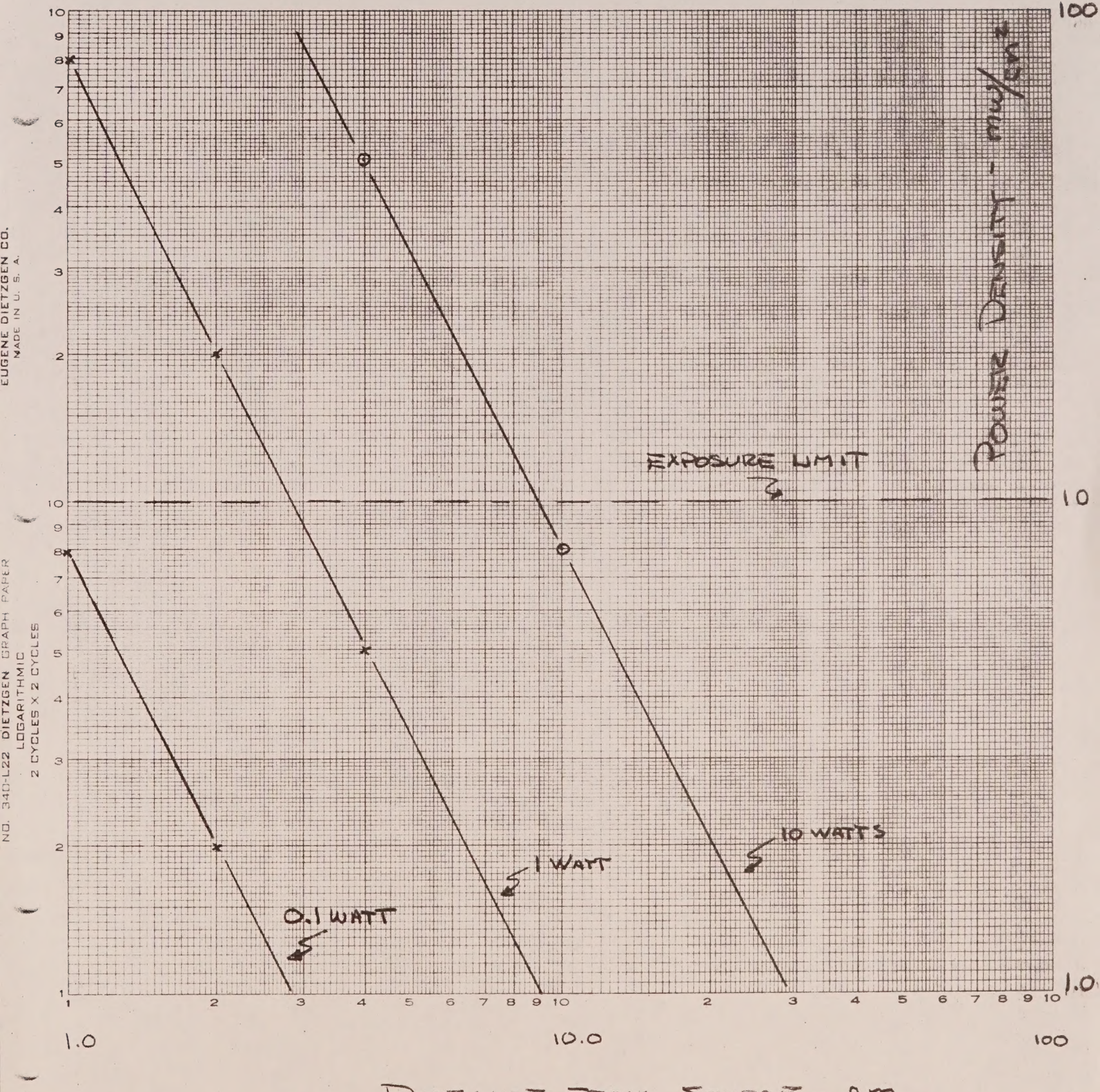
The power density in mW/cm^2 vs. distance from the source in cm is presented in Figure 1 (based on a point source and spherical propagation). For a 1 watt source, the power density is below the 10 mW exposure level at distances equal to or greater than 3 cm.


EXPOSURE LIMIT
0.1 WATT
1 WATT
10 WATTS
POWER DENSITY - mw/cm²
DISTANCE FROM SOURCE - cm
1.0
10.0
100
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